

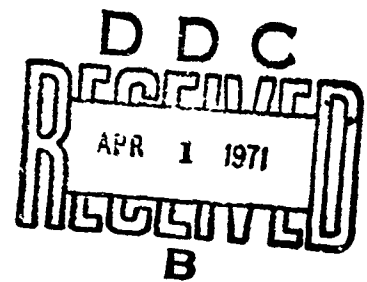
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EFFECTS OF TASK CHARACTERISTICS ON PERFORMANCE

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Final Scientific Report  
AFOSR Grant AFOSR-68-1600  
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## FINAL SCIENTIFIC REPORT

### Effects of Task Characteristics on Performance AFOSR Grant ~~●~~ AFOSR-68-1600

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Yale University

The general purpose of the research was to extend current levels of understanding about tasks and task effects on individual and group performance. Progress was made toward this general goal in four specific areas:

1. Developing conceptual and research tools which may be used in generating and applying knowledge about human task performance.
2. Furthering basic understanding of the effects of tasks on individual performance, and of the relationships between task and other "situational" factors in affecting individual performance.
3. Extending and generalizing current understanding of task effects on small group performance, and developing means of enhancing small group effectiveness.
4. Applying knowledge about task effects to "real world" task situations.

Brief summaries of research carried out in each of these four areas are provided below. References are made to grant-supported research reports, where the methodology and findings of each study are reported in detail.

#### 1: Development of Conceptual and Research Tools

Initial work under the grant was conceptual in nature, and led to a report which attempts to set forth in systematic fashion (a) the

ways tasks and jobs can be described and differentiated, and (b) the means by which task characteristics can affect individual and group performance. This work is reported in detail in Hackman, 1968 (published version dated 1969), and is being incorporated in a monograph-length treatment of conceptual issues in human task performance which is now in preparation.

In addition, research by Hackman and Lawler (in press) involved development and refinement of methodological tools for describing and classifying jobs in on-going organizations. (Substantive findings using these tools are referred to below.)

Finally, exploratory research was conducted to find means of more precise description and analysis of small group tasks (especially of the types of tasks commonly used in basic laboratory research on group performance.) This work did not prove fruitful, in that the gains made in descriptive precision did not appear to add significantly to substantive understanding of performance; therefore, this line of investigation was discontinued.

## 2: Task and Situational Influences on Individual Performance

A large-scale research study was undertaken simultaneously at Yale University and at the U. S. Military Academy which examined (a) the impact of different task characteristics on individual performance, (b) how people use different "performance strategies" for work on various kinds of tasks, and (c) how particular strategies may be particularly effective for some tasks--and ineffective for others. In addition, the research examines the interaction between various personal characteristics of performers and task characteristics in affecting performance outcomes. Data analysis

for this project is now being completed, and a formal research report should be available in about six months. (Hackman, Skrzypek, and Schefflen, in preparation).

The high potency of task characteristics themselves in determining performance outcomes was replicated a number of times in grant-supported research. Two studies were conducted which explored possible relationships between task characteristics and other situational factors in affecting performance. In one study task characteristics were found to so strongly determine performance outcomes that an expected interaction with another situational variable (status of the task-giver) did not materialize. Kutner (1970) examined a different situational variable (degree of interpersonal crowding) on performance, and did obtain some significant effects--although this study did not deal explicitly with interactions between task and situational factors, as did the earlier investigation. In a second paper, Kutner (in preparation) deals with conceptual issues having to do with the impact of crowding on interpersonal behavior, including task performance.

### 3: Task Influences on Small Group Performance

In research conducted by the principal investigator prior to the beginning of AFOSR support, the importance of group task characteristics in understanding and changing group performance was established. Three studies were conducted under grant support which replicated and extended the earlier findings.

Hackman and Vidmar (1970) investigated the impact of task type and group size on group performance and group member satisfaction. Strong effects were found to result both from variation in size and in task

characteristics, but no substantial interactions between the two variables were obtained. (Among other findings, the study suggests that the group size which leads to optimal satisfaction of group members--i.e., between 4 and 5 people--is not the size which leads to maximal effectiveness; both smaller and larger groups performed more effectively than did 4- and 5-person groups, although apparently for different reasons.) The research was conducted simultaneously at two universities (the University of Illinois and Yale University), and substantial differences in obtained relationships were found for subjects recruited at the two locations. This unexpected finding led to a "spin-off" report on problems of inter-laboratory generalization in small group research (Vidmar and Hackman, 1971).

Butkovich (1971) conducted a mini-longitudinal investigation of the interactions between task characteristics, reward structures, and interpersonal spacing as determinants of cooperative task behavior in two-person groups. Once again, task factors were found to be highly potent in determining the nature of performance. In addition, the longitudinal analysis (comparisons made across a moderately large number of trials in an "interpersonal gaming" situation) revealed a number of substantively interesting interactions among the three independent variables.

Finally, Hackman and Hackman (in preparation) conducted a laboratory investigation aimed at improving the task effectiveness of small groups by direct interventions having to do with group process. Based on the results of earlier studies, group members were given explicit instructions about "how to work together" in dealing with various types of tasks. Results were not definitive, but did suggest that the particular process

intervention used may be facilitative of group effectiveness under conditions of high task unfamiliarity and/or difficulty. Research is now being planned to follow up this study and provide more definitive data about when process interventions of various kinds are (and are not) helpful.

#### 4: Generalizations to "Real-World" Settings

Two investigations were conducted to assess the impact of task characteristics in "real-world" performance situations. In addition, these studies provided a test of the generality and usefulness of some of the findings and conceptualizations which had been developed primarily on the basis of research carried out in experimental laboratories. Results of both studies were highly encouraging.

J. Hackman (1970) examined the impact of task characteristics on student behavior in an educational setting. The same task typology which had been used in grant-supported laboratory research was employed in developing classroom "assignments" for an experimental educational unit in a secondary school. Differences in "assignment characteristics" (i.e., task characteristics) were found to have very strong effects on educational outcomes, suggesting that the design of educational tasks may be an important (and currently under-utilized) means of affecting learning outcomes in training situations.

Hackman and Lawler (in press) conducted a field-correlational study of the relationship between the characteristics of jobs (in a large utility) and employee satisfaction and performance. Findings suggested that the way jobs are designed has a strong impact on both satisfaction and performance effectiveness and, further, that employees with different

general "needs" require different (but specifiable) job characteristics in order for satisfaction and motivation to be maximized. An experimental study, in which job characteristics are systematically manipulated, is now being planned as a follow-up to this research. Finally, since the research yielded a number of findings which have immediate practical implications, a report of the research was prepared which is oriented to managers in organizations, and which spells out in specific detail some of the action steps which the research implies (Lawler and Hackman, in press).

#### Listing of Grant-Supported Research Reports

(Note: reports listed below which are now in manuscript form are being prepared to be submitted for publication in professional journals.)

Hackman, J. R. Toward understanding the role of tasks in behavioral research. Scientific Interim Report, AFOSR Grant AF-AFOSR-68-1600, August, 1968.

Hackman, J. R. Toward understanding the role of tasks in behavioral research. Acta Psychologica, 1969, 31, 97-128.

Butkovich, P. M. Task and situational influences on cooperative task behavior. Under editorial review, 1971.

Hackman, Judith D. The impact of classroom assignments on educational outcomes. Experimental Publication System, 1970, 9, Ms. 313-34.

Hackman, J. R. & Vidmar, N. Effects of size and task type on group performance and member reactions. Sociometry, 1970, 33, 37-54.

Kutner, D. Overcrowding: Human responses to density and visual exposure. Under editorial review, 1970.

Hackman, J. R. & Lawler, E. E. III Employee reactions to job characteristics. Journal of Applied Psychology Monograph, in press.

Lawler, E. E. III & Hackman, J. R. Corporate profits and employee satisfaction: Must they be in conflict? California Management Review, in press.

Vidmar, N. & Hackman, J. R. Inter-laboratory generalizability of small group research: An experimental study. Journal of Social Psychology, 1971, 83, 129-139.

Hackman, J. R. & Hackman, Judith D. Group process intervention as a means of enhancing group performance. (In preparation)

Hackman, J. R., Skrzypek, G., & Schefflen, K. C. Task design, performance strategies, and performer characteristics. (In preparation.)

Kutner, D. Toward a theory of overcrowding. (In preparation.)



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| 13. ABSTRACT<br><br>This report summarizes project-supported research. The general purpose of the research was to extend current levels of understanding about tasks and task effects on individual and group performance. Progress made toward this general goal is summarized for four specific research sub-areas:<br><br>1. Developing conceptual and research tools which may be used in generating and applying knowledge about human task performance.<br>2. Furthering basic understanding of the effects of tasks on individual performance, and of the relationship between task and other "situational" factors in affecting individual performance.<br>3. Extending and generalizing current understanding of task effects on small group performance, and developing means of enhancing small group effectiveness.<br>4. Applying knowledge about task effects to "real world" task situations. |  |   |

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| Task<br>Characteristics, Task<br>Dimensions, Task<br>Performance, Task<br>Group<br>Classification, Task<br>Job |        |    |        |    |        |    |